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Talbot and Jones and the N. B. M. A. Standard Rattler Tests of Paving Brick

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COMPARISON OF THE TALBOT-JONES AND THE N. B. M. A. STANDARD RATTLER TESTS OF PAVING BRICK

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BY

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This is to certify that the thesis prepared under the direction of Professor Talbot by

CHARLES WESLEY MALCOLM

entitled COMPARISON OF THE TALBOT-JONES AND THE N. B. M. A. STANDARD RATTLER TEST OF PAVING BRICK

is approved by me as fulfilling this part of the requirements for the Degree of Bachelor of Science in Civil Engineering.

Ira O. Baker

Head of Department of Civil Engineering.

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Comparison of the Talbot-Jones and the N. B. M. A. Standard Rattler Tests of Paving Brick.

Brick pavements rank high in durability and popularity. They give good satisfaction, not only under light travel, but under moderately heavy traffic. With the extended use of brick as a paving material has arisen the necessity of finding methods of determining the quality of paving brick which may be used as standards. The methods of testing that have been in use are the following: (a) Specific Gravity Test; (b) Crushing Test; (c) Cross-Breaking Test; (d) Absorption Test and (e) Abrasion and Impact or Rattler Test. The test now generally accepted and used as the standard is the Abrasion and Impact or Rattler Test. The standard rattler used for making this test is that adopted by the National Brick Manufacturers Association. Since the adoption of the standard rattler, another machine has been brought

out viz: the Talbot-Jones rattler. It will be the purpose of this thesis to make a comparison of the Talbot-Jones and the N.B.M.A. Standard rattler tests and to determine which better determines the quality of brick for paving purposes.

The purpose of the rattler test is to determine the quality of different makes of brick and of different burnings of the same make. To make a good pavement, the brick, taken as a whole, should not only be tough, hard and durable but each brick should possess the same degree of toughness, hardness and durability. The principal cause of the poor results obtained with many pavements is not due to the fact that, taken as a whole, the brick are hard or too soft but that some are hard and others soft. This difference in quality gives rise to unequal wear and rapid disintegration of the pavement.

History of Rattler Tests.

Before the year 1897, there was no attempt at uniformity in the rattler tests of paving brick. Almost every manufacturer

and experimenter used a different form of rattler. Any foundry rattler, used for cleaning castings, was accepted and any lot of foundry scrap was used as shot. There was no uniformity in speed, size of rattler or charge. On account of the great differences in the conditions of the tests, the results obtained by different experimenters were in no wise comparable and were of little use. In February 1895, a commission was appointed by the National Brick Manufacturers Association to investigate the subject of tests for paving brick, and to recommend some form of rattler that could be used as a standard. Prof. Edward Orton, Jr. made a series of tests and in behalf of the commission reported upon a rattler which he recommended for use as a standard. Mr F.F. Harrington also made numerous tests along this line. The results of these two experimenters upon different makes of brick agreed very closely although the tests were made separately. In February 1897, at a meeting of the National Brick Manufacturers Association, the report of the Commission appointed in 1895 was received and the rattler

test, a description of which follows, was adopted. The machine recommended was to be 28 inches in diameter and 20 inches long, measured inside the rattling chamber. The barrel was to be supported on trunnions and in no case was there to be a shaft passing through the rattling chamber. The cross-section of the rattler was a regular polygon having fourteen sides. There was a space of one-fourth inch between the staves for the escape of dust and small pieces of brick. The charge was measured by bulk, it being 15 per cent of the cubic contents of the rattler. The number of whole brick coming nearest this amount was considered a charge. The speed of rotation was 30 revolutions per minute for 1800 revolutions. All brick must be thoroughly dry before rattling. In this form of test it is to be noted that nothing was put into the rattler except the brick themselves. This form of rattler test did not give good satisfaction and its use occasioned much unfavorable comment. It was said, and with good cause, that the test did not distinguish between good and poor paving brick.

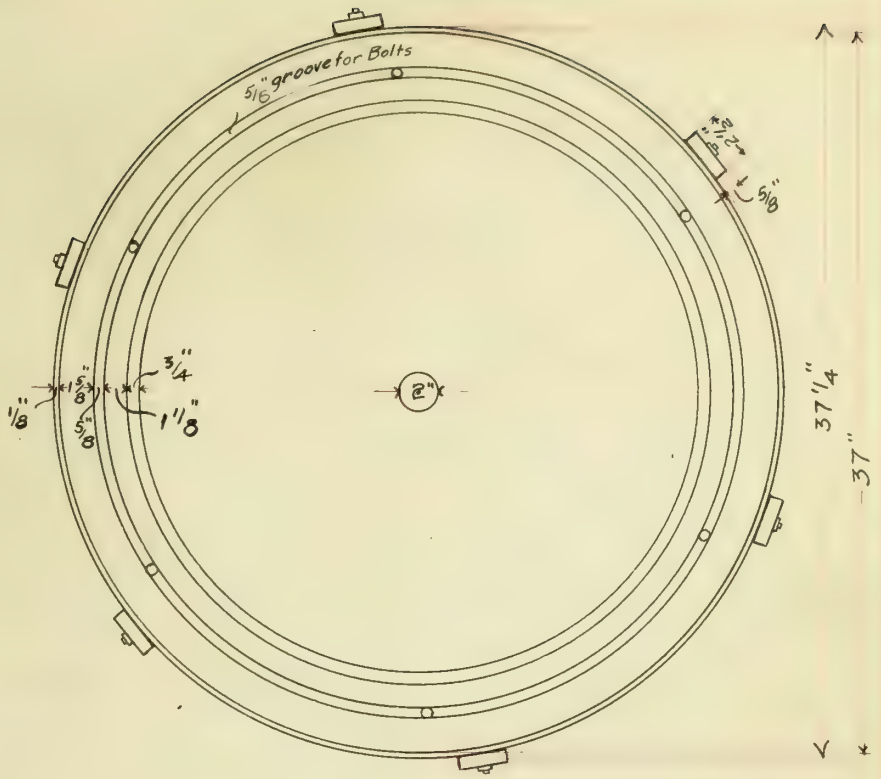
About this time numerous tests were being made by different experimenters, among the most important of whom was Prof. A. N. Talbot, using a charge of cast iron blocks. At the Detroit convention in February 1900, the National Brick Manufacturers Association received a report from a body of engineers recommending that the standard test be amended to require a charge of cast iron shot. This recommendation was adopted and is the method called the standard rattler test in this thesis.

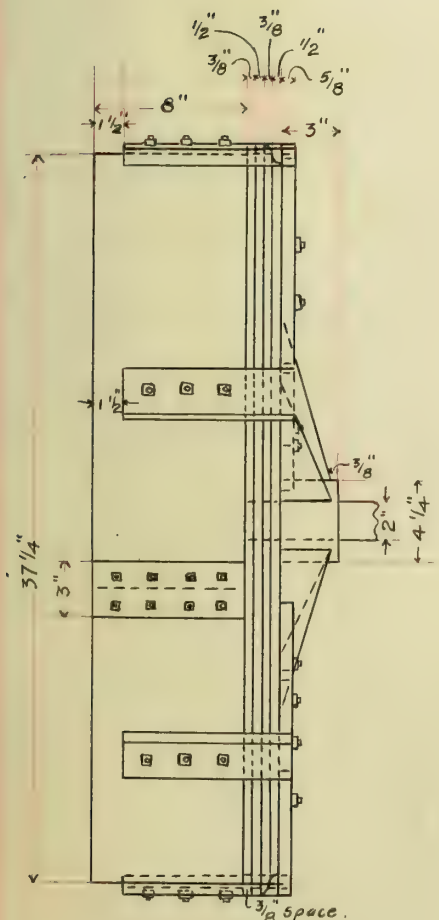
In 1899, Mr. Homer Jones of Geneva, N.Y., devised a rattler in which the brick to be tested were clamped in pockets but tests made by Prof. Orton showed that this machine had many defects. In 1900, Prof. Talbot devised a machine in which the brick were clamped around the circumference forming a brick cylinder, which received the blows and wear of the shot. At a meeting of the National Brick Manufacturers Association, a committee was appointed to investigate the merits of this method of testing brick. This committee recognized the advantages of the new machine but recommend-

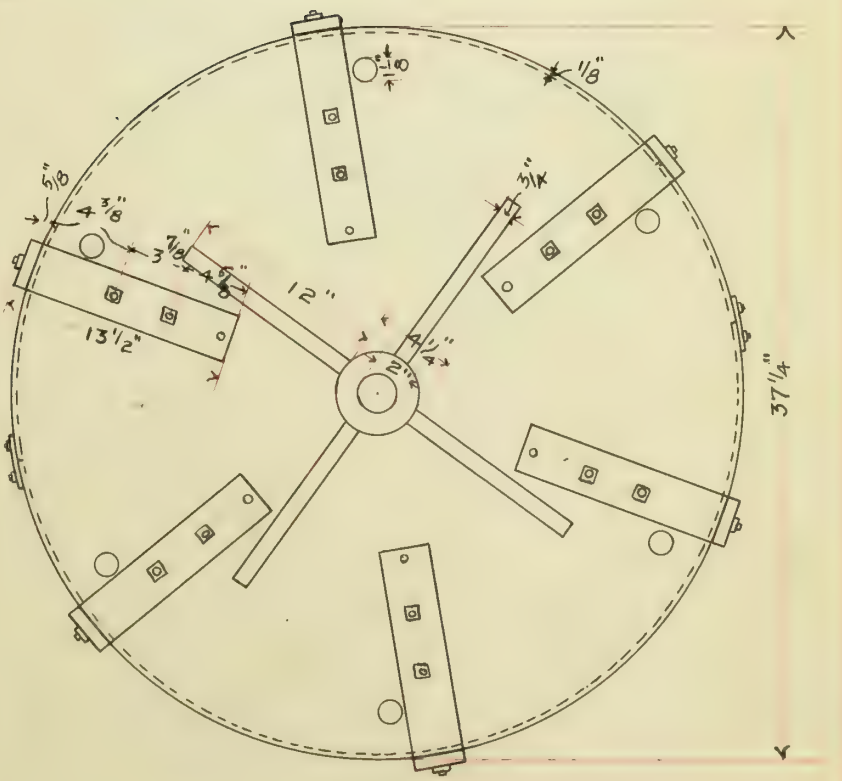
PLATE I.

DETAILS OF THE TALBOT-JONES RATTLER

Scale 1" = 10"







ed that the standard is not changed.

The Machines.

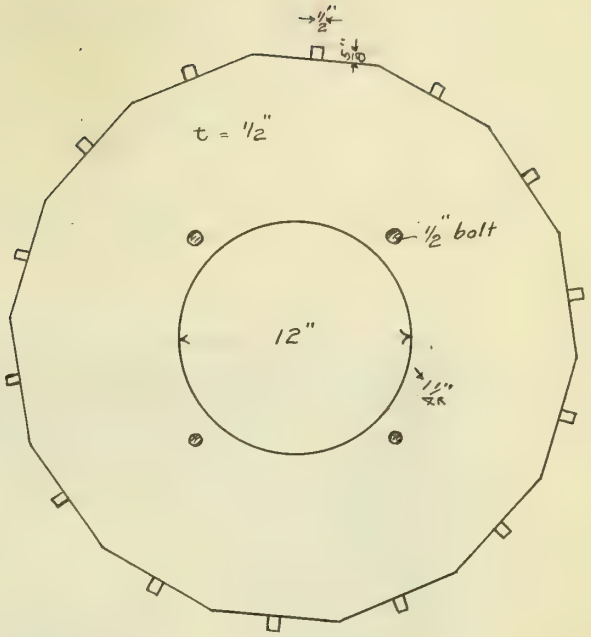
Plates I and II show drawings of the Talbot-Jones and the University of Illinois Standard Rattlers.

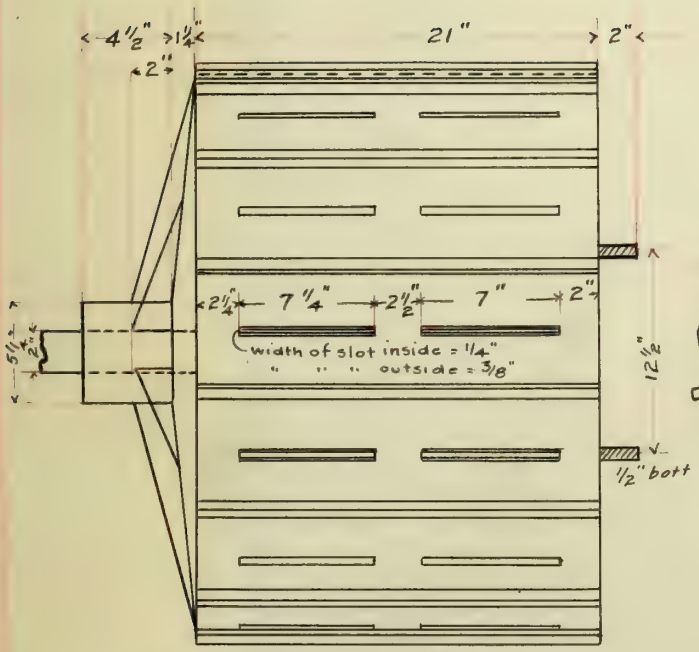
Talbot-Jones Rattler.— The Talbot-Jones rattler (shown in Plate I.) consists of a thin drum 37 inches in interior diameter, fastened to a cast iron head. Between the drum and the head is a space 3/8-inch wide to allow the dust and small pieces of brick to escape. Near the outer circumference of the head, is a groove 5/8-inch wide running entirely around the rattler head. Into this groove are placed the bolts used for fastening the brick in position. This groove is accessible through six holes 1 1/8-inch in diameter. The groove is 1 5/8-inch from the inside of the drum, thus allowing room for the wooden spacers, which are used to separate the bricks. The inside edges of the brick, when placed in position in the rattler, fit against the head for a distance of 3 3/8-inches, the upper portion of them being left free to allow for

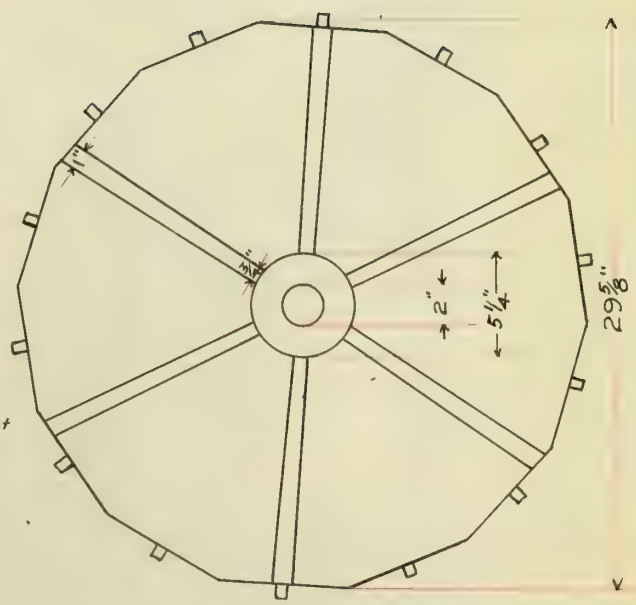
PLATE II.

DETAILS OF THE N.B.M.A. STANDARD RATTLER

Scale 1" = 10"







Rattler made of one piece of cast iron.
Interior Dimensions - Dia. = 28", Length 20".

SHOWING ARRANGEMENT of POSTON BLOCK

IN

TALBOT-JONES RATTLER

BEFORE RATTLING

PLATE I. (a)

SHOWING ARRANGEMENT of POSTON BLOCK

IN

TALBOT-JONES RATTLER

AFTER RATTLING

PLATE II. (a)

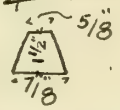
wear. This is accomplished by setting the head back about 3/4 inch at this point. A spacer and a bolt are placed between adjacent bricks, and the outer end of the brick held in position by rectangular washers (see the two photographs of the brick in position in the machine). A wooden end or head was used in the tests, 33 inches in diameter, and 1 3/4 inches thick. There is a hole in this head about 11 inches square to allow the charge of cast iron shot to be put in after the brick are in position and the cover on the rattler. This hole is in turn closed by a wooden cover. A wooden head was used in preference to a steel or iron head to lessen the noise made by the rattler. This head is held some distance from the ends of the bricks by the washers and nuts on the bolts, thus making the ends of the bricks about the same distance from the two ends of the rattler. The rattler is overhung.

Standard Rattler - Details of this rattler are given in Plate II. The principal point of difference between the University of Illinois Standard

Rattler (the one used in the tests) and other Standard Rattlers, is that the W. of I. Rattler is overhung and is accessible through an opening in the end. This makes the charging of the rattler an easy matter. The rattler barrel is of cast iron and is made from a single casting. The interior dimensions are 28 inches in diameter by 20 inches long. One end of the rattler is solid and contains the shaft, the other end having a hole 12 inches in diameter in it. The rattler barrel is made of fourteen staves, there being a narrow slit between each stave to allow the brick dust and chippings to escape (see Plate II.). These slits are 1/4 inch wide on the inside and 3/8 inch wide on the outside. The thickness of the outside head is 1/2-inch and of the staves at the slits 5/8-inch. Four bolts are set into the outside head and provided with thumb screws for fastening the cover. This rattler was made too light and cracked at the staves requiring patching and repairs.

Charge and Speed

Talbot-Jones Rattler — In the Talbot-

Jones rattler, enough brick or blocks to fill the entire circumference were used. This number is about 25 or 26 blocks of the Clinton size or about 33 of the brick size. The number depends somewhat upon the spacing used. In the spacing used in the tests, the distance between bricks at the inner face was about 1/4 inch, the size of the spacers being as follows 

. The charge of cast iron shot consisted of sixty (60) pounds of 2 1/2 inch cubes and ninety (90) pounds of 1 1/2 inch cast iron cubes, the individual cubes being replaced by new ones after they had lost one-tenth of their original weight. The corners of the cubes were slightly rounded before using in a test. The speed was about 42 1/2 revolutions per minute, the rattler being run 3000 revolutions at this speed.

Standard Rattler — The charge used in the standard rattler consisted of twelve (12) brick or nine (9) block together with three hundred (300) pounds of cast iron shot. The charge of shot was made up of 225 pounds of 1 1/2 inch cubes and 75 pounds of rectangular cast iron blocks 2 1/2 inches square by 4 1/2

inches long with slightly rounded corners, the block weighing about 7½ pounds each. The individual pucs were replaced by new ones after they had lost one-tenth of their original weight. The spud used in the tests was about 30½ revolutions per minute, the rattler being run for 1800 revolutions.

Conditions of Tests.

The number of revolutions of the rattler during each test was recorded by a counter and this number in turn checked by taking the time of the test. All brick were dried before using. The sharp edges of the cast iron cubes were worn off before the cubes were used in a test. The Terre Haute brick were graded by the manufacturers and again graded by the writer before they were tested. The Clinton block were selected from piles on the street ready to be used in the pavement. The Poston block were taken from the pavements on Taylor and Walnut streets, Champaign, Illinois, where they had been under direct and moderately heavy traffic for a city of 10000 inhabitants.

The two streets were paved at the same time, about November 1st., 1898, and the brick were taken from the pavement in November, 1901. It is almost impossible to determine the relative amount of traffic upon the two streets.

Preliminary Tests.

Several tests were made to determine the spacing to be used in the Talbot-Jones rattler. The brick used in these preliminary tests were a soft grade of Clinton block. Two tests were made using a spacing of about ½-inch. With this spacing the brick were found to chip badly. Greater difficulty was also found in obtaining a uniform spacing than when the ¼-inch spacing was used. A spacing of about ⅜-inch was tried but when Clinton blocks were used, 26 block could not be placed in the rattler and 25 block did not completely fill the circumference. A test was also made without spacers, the brick being placed as closely together as the bolts would allow. This spacing was found to be impracticable as it was impossible to keep the brick from becoming loosened during the progress of the test. An advantage found

with the 1/4-inch spacing was, that for the various makes and sizes used, the circle was more readily finished with an even spacing. Another advantage of this spacing was that it was better adapted to brick sizes as the chipping effect was less. It is known from the tests made by Prof. Edward Orton, Jr., that the wear with narrow spacing varies little up to a spacing of 1/2-inch, so that slight changes in the distances apart of the brick will not materially affect the results. The standard spacing finally chosen for these tests was that which was given by using one block (Clinton) less than the number necessary to approximately fill the rattler circumference. This spacing averaged about 1/4-inch measured on the inside of the brick cylinder. This spacing was chosen because it gave more opportunity for uniform and convenient spacing, held the brick firmly, avoided excessive chipping and gave sufficient roughness to the brick cylinder to carry the shot up the side of the rattler at the given speed.

Results of Tests (Pages 32 and 33)

Tables I, II and III give the results of tests made upon different makes of brick, and different grades of the same make, by the Standard and the Talbot-Jones rattlers. (Plates III, IV, V etc. show diagrams made by plotting the individual losses of brick in the Talbot-Jones rattler. The tests on the different makes of brick will now be given.

Tests on Clinton Block.

Plate III shows the results of tests in the Talbot-Jones rattler upon medium, soft and hard-overburnt Clinton block. The different diagrams are plotted to the same scale and are made by plotting the individual losses in the order of the loss of each brick. For the medium Clinton block, two lines represent the results obtained by rattling the brick first on one side, and then on the other. The same method was used for the soft grade. Separate charges were used for the two tests of overburnt block. That the Talbot-Jones rattler readily distinguishes between medium, soft and hard block is shown by noting the mean per cents lost viz:

medium, 4.02; soft, 8.44 and hard overburned, 15.90. Referring to Table I, the results obtained with the Standard rattler upon the same grades of block are 21.51, 25.12 and 26.73 per cent, respectively, for medium, soft and hard grades. The results given for the medium and soft grades are the averages of two tests but only one test was made for the hard, overburned blocks. It is quite evident that the Talbot-Jones rattler distinguished more markedly between the different grades. The Standard test gave little difference between the soft and hard Clinton block. The ratio of the losses for the Talbot-Jones test is as 1 : 2.1 : 3.9 for the medium, soft and hard grades respectively and for the Standard test, 1 : 1.17 : 1.21 respectively, for the same grades.

Plate IV shows the results of the same tests as Plate III. The losses are, however, plotted in the order of the brick in the rattler. The lines show that the order of the brick has nothing to do with the actual losses. Referring again to Plate IV and comparing the curves showing the losses of the brick when rattled

on one side and them on the other, it is seen that, although the mean values are about the same, the individual losses of the two sides differ widely. This may be partly explained by the fact that the brick are not uniform throughout but some of the difference must be charged to the imperfections of the test itself. Another fact shown by these tests is that the extreme losses for the medium block (considering the individual block) do not vary within nearly as wide limits as the extreme losses of the soft and the hard (overburned) blocks. This fact makes it evident that a requirement, that the mean losses of the first third of the charge, taken in the order of the percent lost, should not differ more than — per cent from the mean of the last third, might make a good specification.

Terre Haute Brick.

The results obtained by testing the Terre Haute brick are shown in Table II. Plate V shows the individual losses obtained from the Talbot-Jones rattler test, upon medium and soft brick. The losses are plotted in the order of the per-

cent lost by the individual brick. The mean value given for the soft brick is the mean of two separate charges and for the medium grade, the results of rattling first on one side and then on the other. No complete test was made upon the hard repressed brick of this make as they became loose in the rattler before the test was completed. This was due to the fact that a very small number of spacers was used, the spacers being left out in many cases to make the spacing more uniform. Plate VI. gives the results upon the medium grade of brick, shown in Plate V, plotted in the order in which they were placed in the rattler. One line shows the results of rattling on one side, and the other, the results when the brick were turned over and the opposite side rattled.

The tests upon the brick again show, as in the tests upon Clinton block, that the Talbot-Jones test gives a very good distinction between the medium or best grade and the soft brick, the mean values of the two tests being 9.40 and 18.08 per cent respectively. The results obtained with the Standard rattler are given

in Table II. The grades were the same as were used in the Talbot-Jones test. In addition tests were made upon hard, repressed brick. The following values are means of two tests upon each grade: medium, 24.20 per cent; soft, 31.45 per cent; and hard, 26.93 per cent. Here again the hard, overburned brick are not readily distinguished by the test. The Talbot-Jones rattler again gives a greater difference in losses between the medium and soft grades, there being no tests made upon the hardest grade. The ratio of the losses in the Talbot-Jones rattler upon these brick are as 1 : 1.93 for the medium and soft grades respectively and for the Standard rattler 1 : 1.30 : 1.11 respectively for the medium, soft and hard brick.

Plate VII shows curves of the individual losses of soft brick (Terre Haute) in the Standard rattler. Brick were selected that weighed the same before rattling and the individual percentages were obtained by weighing each brick after testing. In the first test, three brick were badly broken and in the second, two brick were so badly broken that the individual losses could not be

obtained. These test show that the variation in loss in the Standard rattler, upon this grade of brick, is greater than in the Talbot-Jones rattler. This is partly due to differences in quality of the brick, but must be charged largely to rattler accidents of the tests.

New Posion Block

Table III gives a summary of the results of testing new Posion block i.e. not from pavement, in each rattler. Plate VIII shows the individual losses obtained from the Talbot-Jones test, plotted in the order of their losses. The lower lines, marked best grade, show the results of first rattling the brick on one side and then turning them over and rattling on the other side. The mean value (4.69 per cent), is the mean of two tests. The upper line represents the results of one test of soft Posion block and the value (16.11 per cent) is a mean of the individual losses in the test. The corresponding results obtained for the same grades of brick in the Standard rattler are, 22.95 per cent for the best grade and 27.66 per cent for the soft brick. The latter is the result of a single test while the former is the mean of two tests. The

difference in loss between the poor and good grades, in the Talbot-Jones rattler is very marked while in the Standard rattler, as in the cases of the lists of the Clinton and Terre Haute brick, the difference in loss is not great. The ratio of the loss upon these brick in the Talbot-Jones list is as 1:3.44 for the medium or best and the soft grades respectively and as 1:1.71 for the Standard list upon the same grades.

Plate IX shows the results of rattling the best grade of Posion block, first on one side and then on the other. The individual losses in the two lists agree very closely as shown by the two lines. In almost all the individual brick, the direction of the lines is approximately the same. The mean losses for the first and second time listed were 4.56 and 4.82 per cent respectively, the mean value of the two lists being 4.69 per cent.

Posion Block from Pavement

Table III gives a summary of the results of the tests made, in both the Talbot-Jones and the Standard rattlers, upon Posion block from Taylor and Walnut streets and Plate X shows the lists plotted in the order of individual losses.

The block had been in the pavement and under traffic from November, 1898 until November, 1901, when they were taken out for testing. Block were selected from both Taylor and Walnut streets that had worn well and also some that had not worn well, it being the object of the writer to determine which rattler better graded the brick. The brick were tested upon the unworn side, i.e. upon the side that was not exposed to traffic in the street.

Block from Taylor Street.

The loss of the block from Taylor street in the Talbot-Jones rattler was 3.28 per cent for those that had worn well and 4.79 per cent for those that had not worn well. In the standard rattler, the losses were 15.09 per cent for those that had worn well and 23.36 per cent for those that had not worn well. It is thus seen that both rattlers graded the brick as they were graded by the writer according to actual wear. The ratio of the losses of those that had worn well to those that had not was as 1:1.48 for the Talbot-Jones test and as 1:1.55 for the standard test. These results show that

there was little difference in the grading by the two raters. The results of the tests in the Standard rather were probably a little lower than they would be for new brick as the edges of the blocks were somewhat worn. Both tests show that the blocks were exceptionally good, as the tests upon those that had not worn well in the pavement, showed about the same loss as the best new brick tested.

Blocks from Walnut Street

The conditions of the tests were practically the same as those upon block from Taylor street. The loss of the block from Walnut street in the Talbot-Jones test was 6.89 per cent for those that had worn well and 8.71 per cent for those that had not worn well. In the Standard test, the losses were 16.60 per cent and 25.41 per cent. respectively, for those that had and those had not worn well. Both raters again distinguished between the good and poor bricks from the same street and graded them as did the writer. The blocks from Walnut street were evidently not as good as those from Taylor street as is shown by the tests. The traffic may

have been somewhat different upon the two streets, which would have influenced the grading somewhat. Then, again, the quality of the brick was probably not exactly the same as the block were from different shipments. There is, however, some uncertainty as to the correctness of the result obtained in the Standard test upon brick that had worn well from Walnut street. These block did not stand as good a test in the Talbot-Jones test (see results in Table III) and upon inspection and testing for absorption were evidently poorer brick, yet the value 16.60 per cent is very low and would rank the block as very good. The result of this test is questionable, yet a diligent search failed to give any adequate explanation for it.

That the wear in the Talbot-Jones test is much like that in the street is evident from an inspection of the two sides of the block after rattling. The wear, upon the side rattled and also upon the side exposed to traffic in the street, was very much the same. In most cases, when the block had chipped badly in the pavement, the loss in the rattler was also mostly

due to chipping and when the block had worn by abrasion on the pavement, the same was true on the rattler.

Conclusions.

To sum up the conclusions drawn from the tests made by the two rattlers and from other considerations, the following discussion is given.

Cost - In comparing the costs of the Talbot-Jones and Standard rattlers and tests, the latter has the advantage as it costs somewhat less to construct the machine, less for operation and less for repairs.

Simplicity - The Standard rattler test is much the simpler of the two tests. The Talbot-Jones rattler is more complicated than the Standard and the bolts will require frequent renewal.

Convinience - As to convinence, the Standard rattler test has a marked advantage. The brick and charge of shot are easily put into the rattling chamber, requiring little work, while the labor attended with the clamping of the brick in Talbot-Jones rattler is considerable.

Time of Test - A very great advantage which the Standard test has over the Talbot-Jones test

is in the matter of time required for the test. The Standard test requires about 60 minutes for rattling and say, 10 minutes for charging and removing the charge from the rattler, making the total time required about 1 hour 10 minutes. The time for weighing the brick will not be considered in either test. The time required for the Talbot-Jones test is about as follows: time to place brick in position in the rattler, about 60 minutes; time of rattling about 70 minutes; time to put on and remove the cover, to put in and remove the charge of shot and to remove the brick about 30 minutes. This makes a total of 2 hours 40 minutes for the Talbot-Jones test as compared with 1 hour and 10 minutes required to make the Standard test.

Uniformity of Results - (Referring to Tables I II and III, it is seen that the advantage is slightly in favor of the Talbot-Jones test for brick of the same grade.

Uniformity of the Bricks - That the brick, even those used in the same test and carefully selected, are not uniform in quality is evident from both rattler tests although more

clearly brought out by the Talbot-Jones test. This latter test has the advantage of determining the losses on individual brick and hence the uniformity of the product.

Ratio of the Loss of Poor Brick to Good - As noted in the discussion, the Talbot-Jones test gives a greater difference between good and poor brick than does the Standard test. For Clinton block the ratio of the losses of medium, soft and hard (overburned) brick is as 1:2.1:3.9 respectively and for the Standard rattler as 1:1.17:1.21 respectively for the grades in the order named. For Terre Haute brick, the losses are as 1:1.93 for the Talbot-Jones test and as 1:1.30 for the Standard test. The comparison is not so easily shown when brick from the pavement are considered as the side that had been worn by traffic in the pavement was not worn in the Talbot-Jones rattler, while the Standard test, from its very nature, wore all sides of the brick. The ability to show higher ratios of loss adds to the grading power and is an important advantage.

Similarity to Wear in the Street - The Standard test does not give a wear that is at all

comparable with the wear in the street. This is evident from the very nature of the test. On the other hand, the wear given by the Talbot-Jones rattler corresponds closely to that caused by traffic in the street. This is at once evident from an inspection of the two sides of the same brick, i.e. the side that was worn in the street and the side that was exposed to the rattler test.

Grading and Ranking of the Brick. The results of the tests shown in Tables I, II and III, in the opinion of the writer, justify the statement that the Talbot-Jones test better grades the brick as to their actual qualities than does the Standard test. The Standard test did not give a very great difference between the different grades, especially between the soft and very hard brick.

In conclusion, it is the opinion of the writer that the Standard rattler test is better adapted to the testing of brick than the Talbot-Jones test when cost, simplicity, convenience and time of the test are governing factors but that the reverse is true when uniformity of results, ratio

of the loss of poor and good brick, similarity to wear in the street, and grading and ranking of the brick are considered.

TABLE I.

RESULTS OF RATTLER TESTS

Make: Clinton Block. Size: 3¾" to 4" × 3⅜" × 9¼"

GRADE	LOSS IN PERCENT OF ORIGINAL WEIGHT.					
	TALBOT-JONES RATTLER.			STANDARD RATTLER.		
	1st. Test	2nd. Test	Mean	1st. Test	2nd. Test	Mean
Best Medium	* 4.46	* 3.57	4.02	21.57	21.45	21.51
Soft	* 11.09	* 5.78	8.44	26.64	23.59	25.12
Hard-Cindery	# 15.60	# 16.20	15.90	26.73	-----	26.73

* *Rattled on one side, then turned over and rattled on other side.*

\# *Separate charges*

TABLE II.

RESULTS OF RATTLER TESTS.

Make: Terre Haute Brick Size: 4" to 4⅛" × 2½" × 8¾" to 8⅞"

GRADE	LOSS IN PERCENT OF ORIGINAL WEIGHT					
	TALBOT-JONES RATTLER			STANDARD RATTLER		
	1st. Test	2nd. Test	Mean	1st. Test	2nd. Test	Mean
Best Grade Medium	* 9.58	* 9.21	9.40	22.87	25.53	24.20
Soft	# 20.14	# 16.03	18.08	32.01	30.88	31.45
Hard-Repressed	- - -	- - -	- - -	25.48	28.37	2693

* *Rattled on one side then turned over and rattled on other side*

\# *Separate charges*

TABLE III.

RESULTS OF RATTLER TESTS

Make: Poston Block Size: 3⅜" to 3½" x 3¾" to 4" x 9" to 9¼"

NEW BLOCK						
GRADE	LOSS IN PERCENT OF ORIGINAL WEIGHT					
	TALBOT-JONES RATTLER			STANDARD RATTLER		
	1st. Test	2nd. Test	Mean	1st. Test	2nd. Test	Mean
Soft	16.11	----	16.11	27.66	---	27.66
Best Grade	4.56	4.82	4.69	24.53	21.37	22.95

BLOCK FROM PAVEMENT				
STREET TAKEN FROM	LOSS IN PERCENT OF ORIGINAL WEIGHT			
	TALBOT-JONES RATTLER		STANDARD RATTLER	
	Had worn well	Had not worn well	Had worn well	Had not worn well
TAYLOR ST.	* 3.28	* 4.79	15.09	23.36
WALNUT ST.	* 6.89	* 8.71	# 16.60	25.41

* *Tested on unworn side i.e. side that was down in pavement.*
\# *Result questionable*

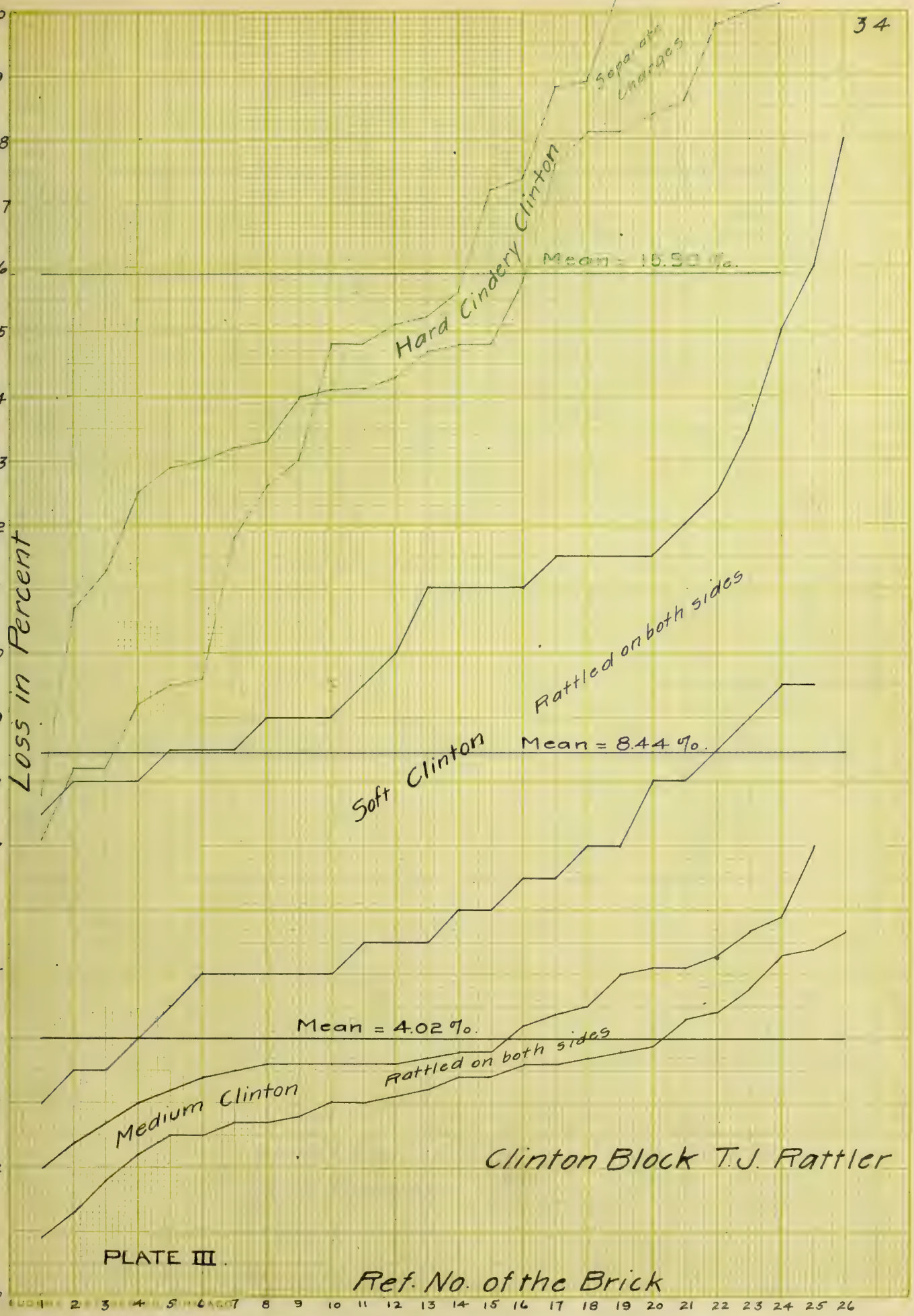

Loss in Percent
Hard Cindery Clinton
Separate Charges
Mean = 15.50 %.
Rattled on both sides
Soft Clinton
Mean = 8.44 %.
Mean = 4.02 %.
Medium Clinton
Rattled on both sides
Clinton Block T.J. Rattler
Ref. No. of the Brick

PLATE III.

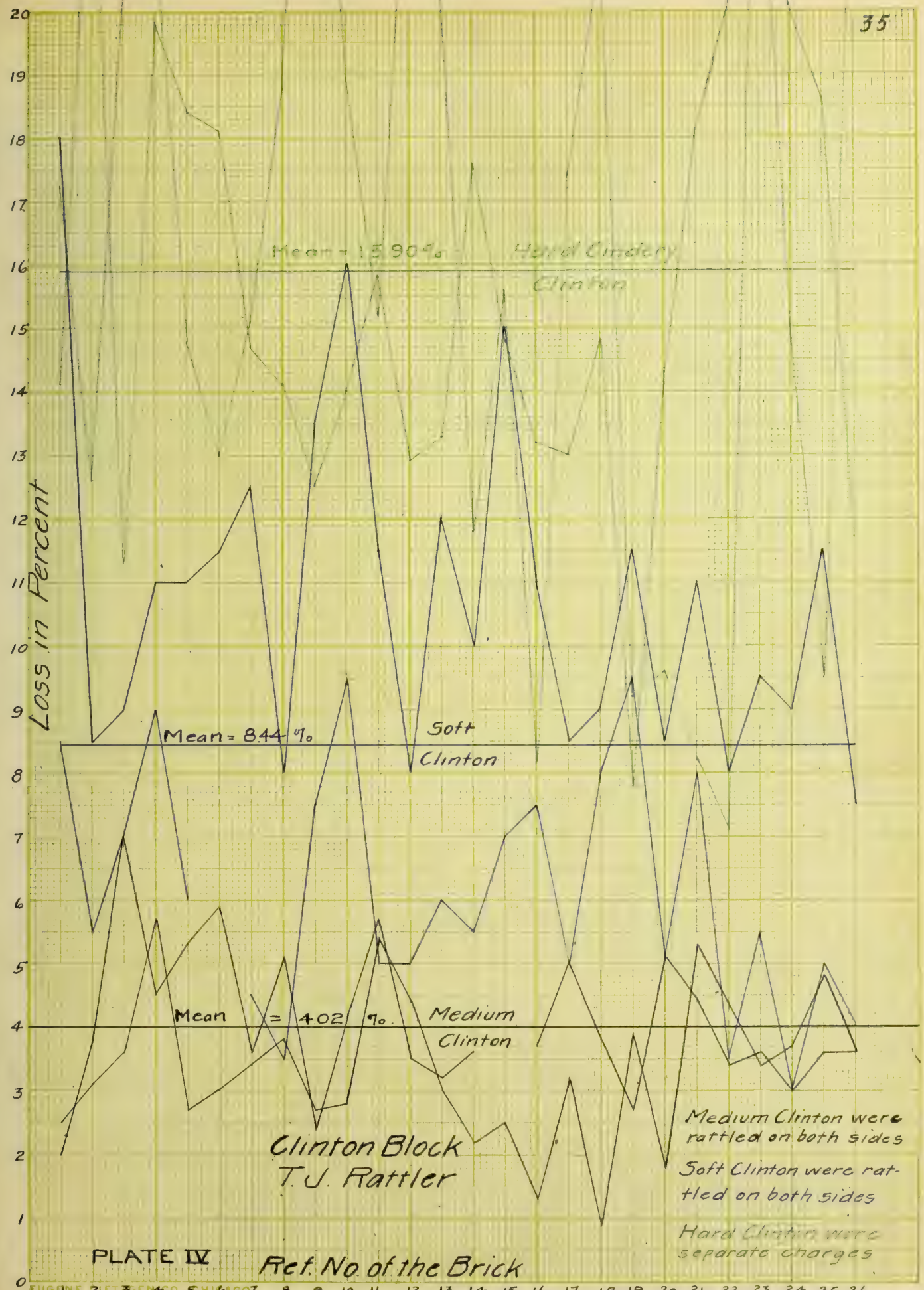
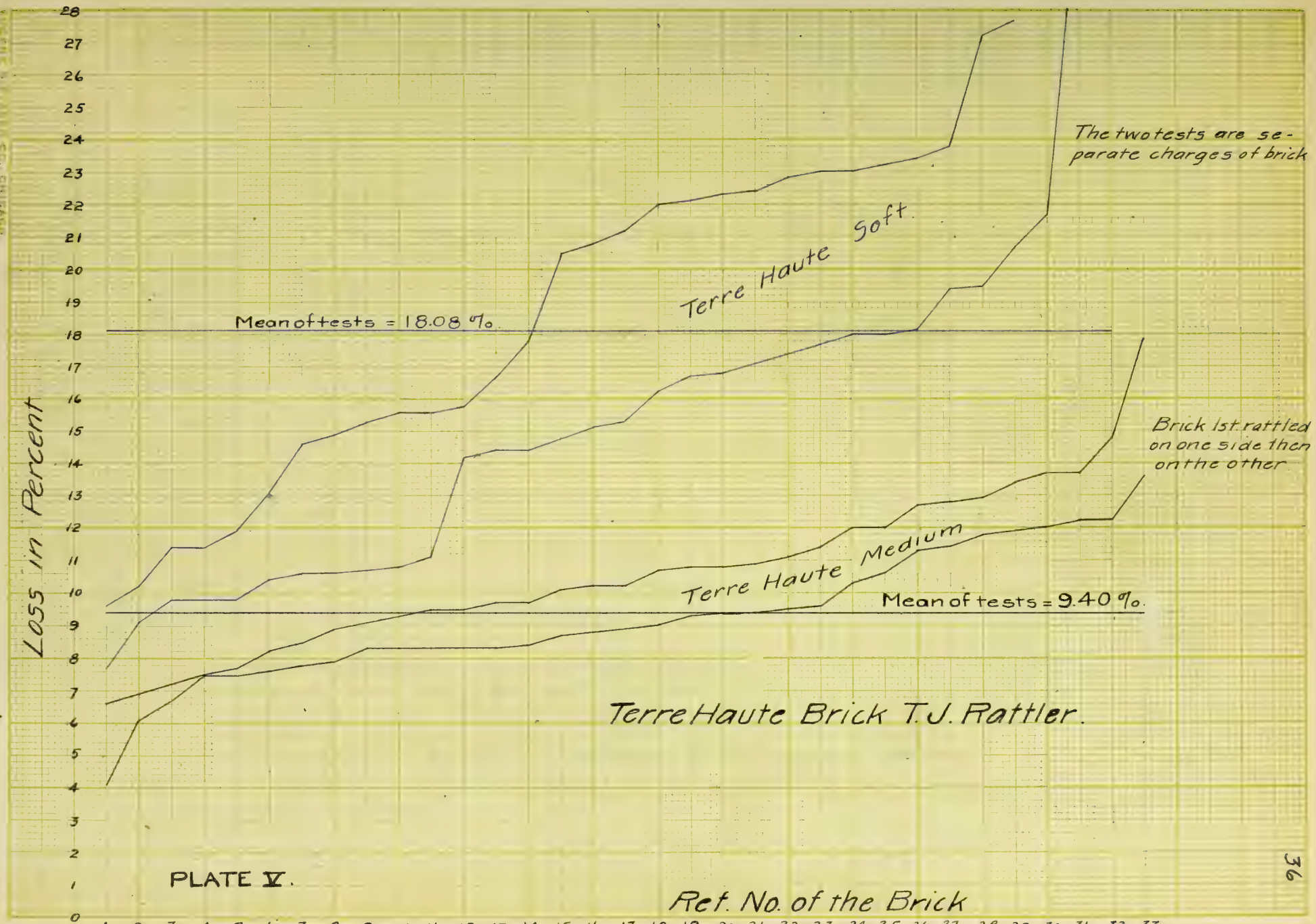
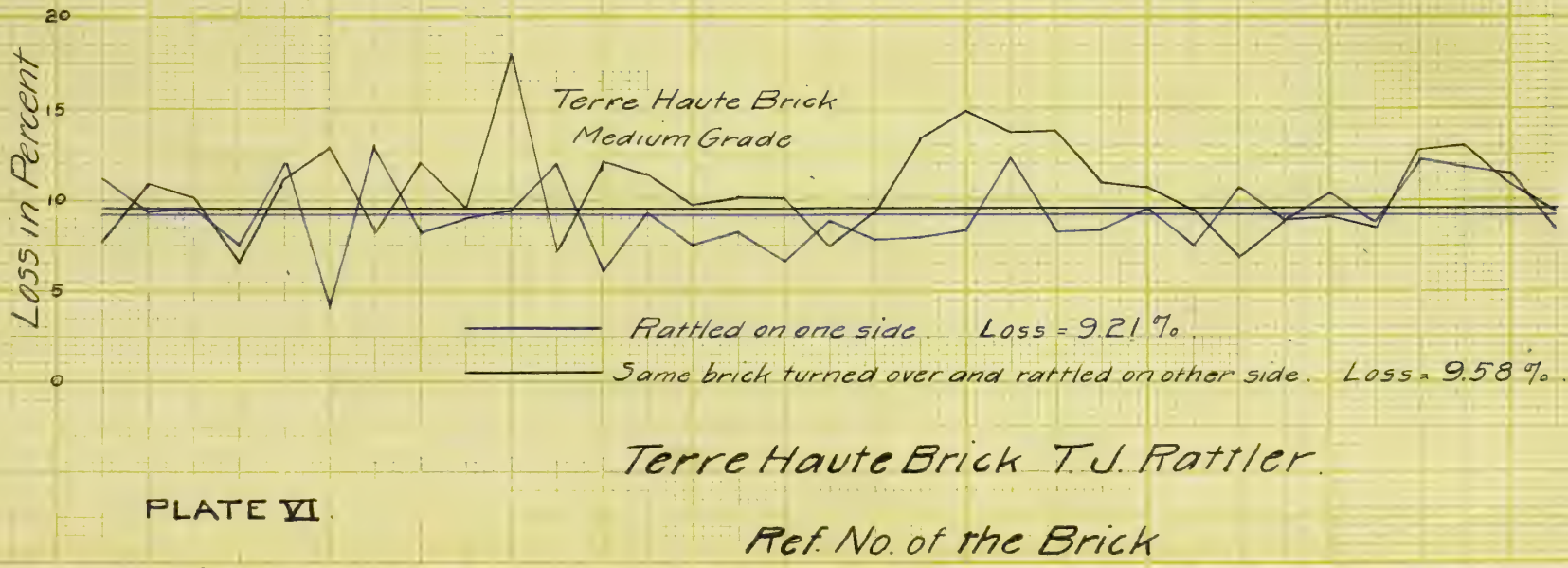

Loss in Percent
Mean = 15.90 %
Hard Clinton
Mean = 8.44 %
Soft
Clinton
Mean = 4.02 %
Medium
Clinton
Clinton Block
T. J. Rattler
Ref. No of the Brick
Medium Clinton were rattled on both sides
Soft Clinton were rattled on both sides
Hard Clinton were separate charges

PLATE IV


Loss in Percent
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Mean of tests = 18.08 %.
Terre Haute Soft.
The two tests are separate charges of brick
Brick 1st rattled on one side then on the other
Terre Haute Medium
Mean of tests = 9.40 %.
Terre Haute Brick T.J. Rattler.
PLATE V.
Ref. No. of the Brick
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33


20
15
10
5
0
Loss in Percent
Terre Haute Brick
Medium Grade
Rattled on one side. Loss = 9.21 %.
Same brick turned over and rattled on other side. Loss = 9.58 %.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Ref. No. of the Brick

Terre Haute Brick T. J. Rattler.

PLATE VI.

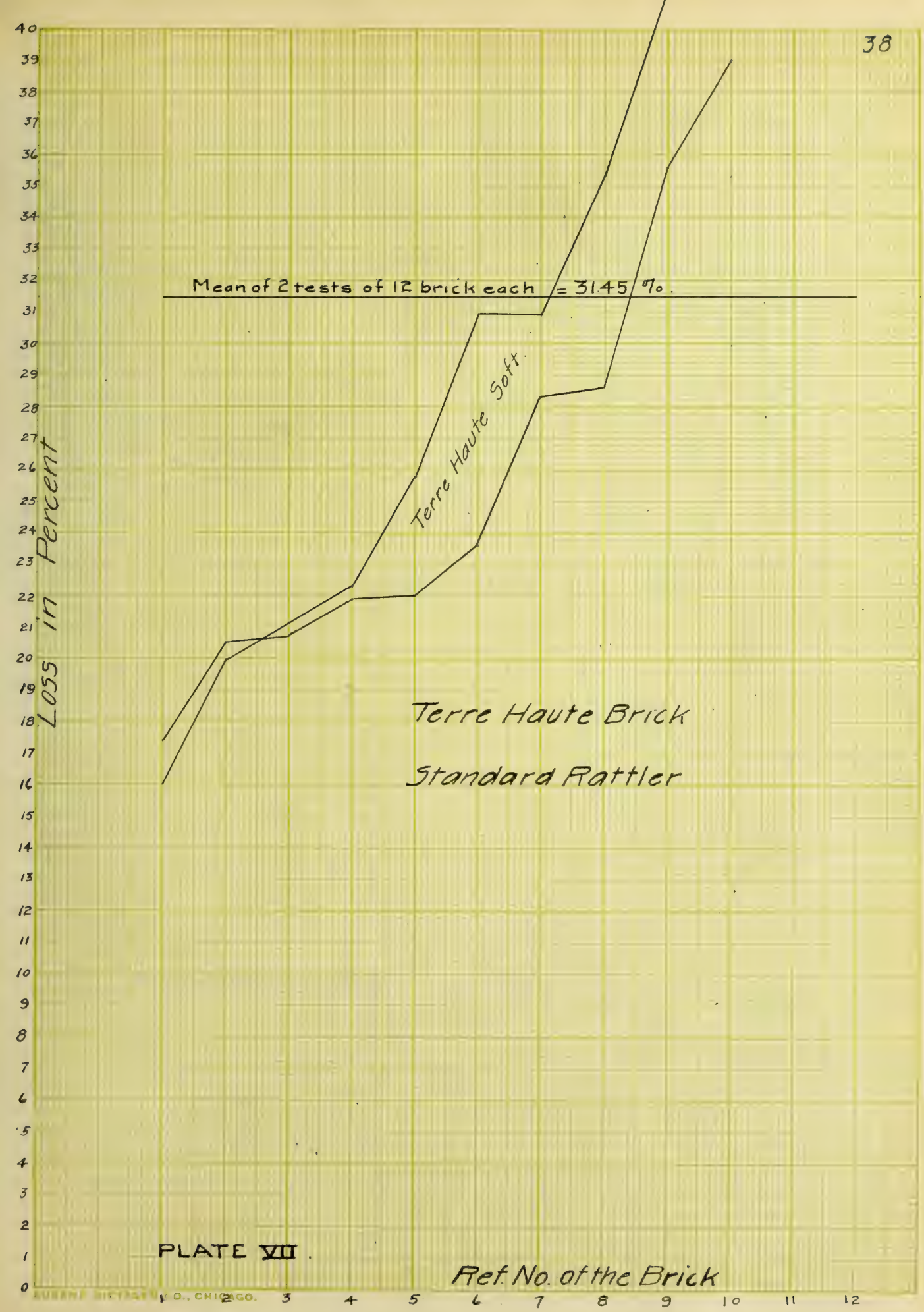

Mean of 2 tests of 12 brick each = 31.45 %.
Terre Haute Soft.
Terre Haute Brick
Standard Rattler
Loss in Percent
Ref. No. of the Brick
0 1 2 3 4 5 6 7 8 9 10 11 12
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

PLATE VII.

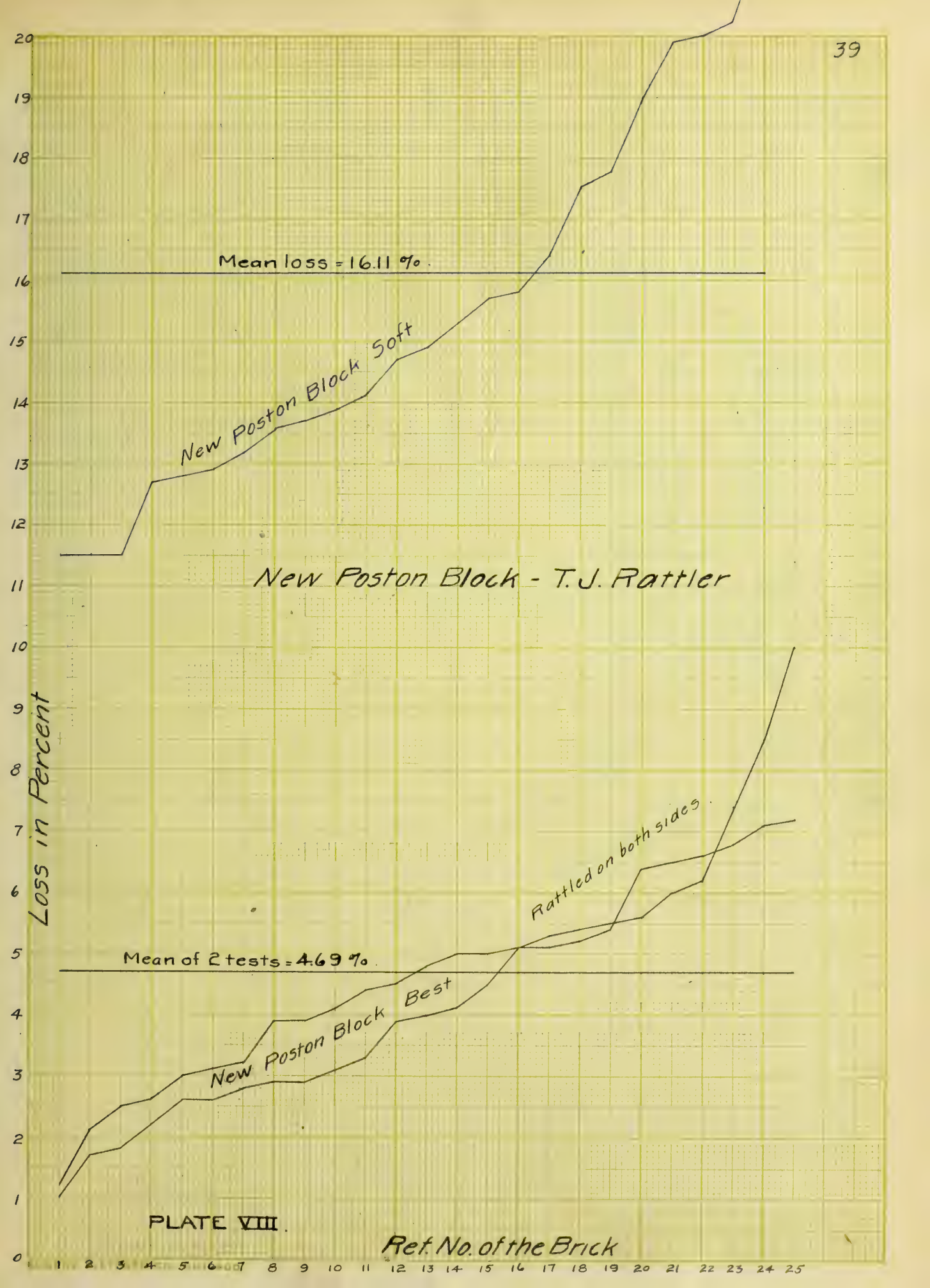

Mean loss = 16.11 %
New Poston Block Soft
New Poston Block - T.J. Rattler
Loss in Percent
Mean of 2 tests = 4.69 %
Rattled on both sides
New Poston Block Best
Ref. No. of the Brick

PLATE VIII.

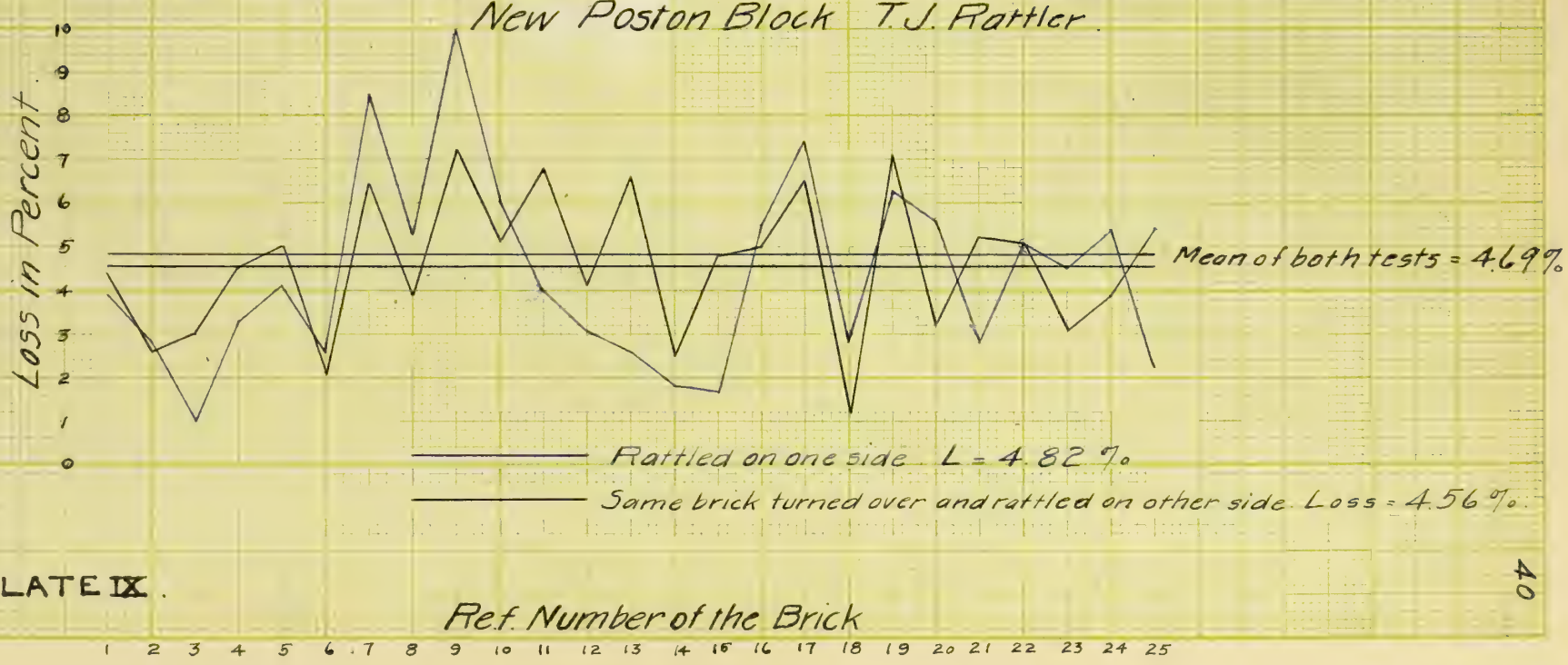
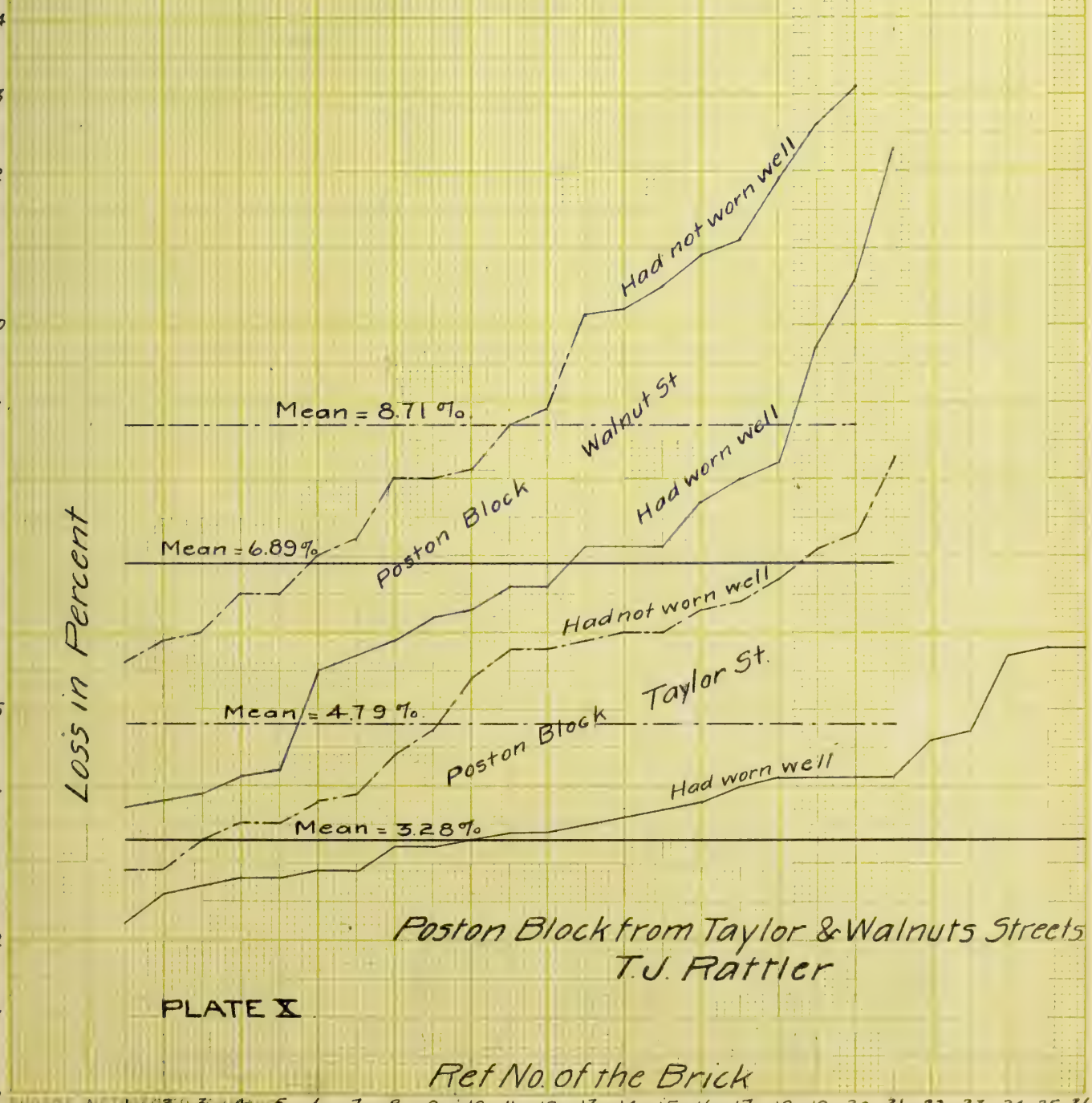

New Poston Block T.J. Rattler.
Loss in Percent.
0
1
2
3
4
5
6
7
8
9
10
Mean of both tests = 4.69%
Rattled on one side. L = 4.82 %
Same brick turned over and rattled on other side. Loss = 4.56 %.
Ref. Number of the Brick
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

PLATE IX.



Poston Block from Taylor & Walnuts Streets
T.J. Rattler

PLATE X

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